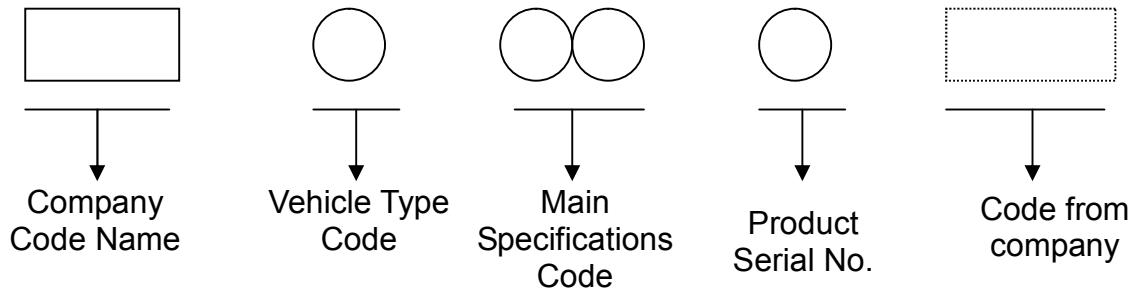


1.2 Vehicle Model: HFC3251KR1



Company Code Name: HFC-----represents JAC motor

Vehicle Type Code: 1---Cargo truck 2---Off-road vehicle 3---Dumper
 4---Tractor 5---Special purpose vehicle 6---Passenger car
 7---Sedan 9---Semitrailer

Main Specifications Code: 25---represents the maximum gross weight is 25 tons.

Product serial No.: 1---Product development serial No. (1st change, 2nd development)

Code from company: K---Diesel R1---King cabin

For example: HFC3251KR1 represents JAC vehicle with king cab, 25 tons maximum gross weight, the first change.

1.4 Tightening Torques of Bolts and Nuts for Hyundai

Unless otherwise specified, the parts and equipment of vehicle must be tightened by the following standard bolts nuts. Tightening torques for these bolts and nuts are shown below.

Note:

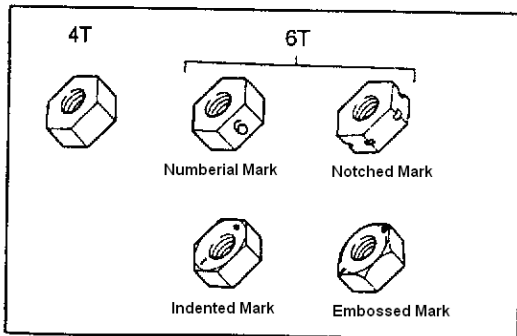
Threads and seat surface must be in dry state.

When there is a difference between the nut and bolt(stud) identification marks, tighten to the torque corresponding to the bolt(stud) identification mark.

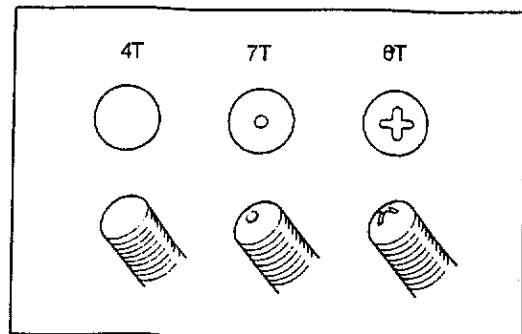
Standard bolts and nuts

Dia /mm	Pitch mm	4T(Head mark 4 or ○)	7T(Head mark 7 or ⊖)	8T(Head mark 8 or ⊕)
5	0.8	2.0-2.9(0.2-0.3)	3.9-5.9(0.4-0.6)	4.9-6.9(0.5-0.7)
6	1.0	3.9-5.9(0.4-0.6)	6.9-10.8(0.7-1.1)	7.8-11.8(0.8-1.2)
8	1.25	8.8-13.7(0.9-1.4)	16.7-25.5(1.7-2.6)	19.6-29.4(2.0-3.0)
10	1.25	18.6-27.5(1.9-2.8)	34.3-53.9(3.5-5.5)	44.1-58.8(4.5-6.0)
	1.5	17.7-26.5(1.8-2.7)	32.4-49.0(3.3-5.0)	42.1-58.8(4.3-6.0)
12	1.25	33.3-49.0(3.4-5.0)	68.6-93.2(7.0-9.5)	83.4-108(8.5-11)
	1.75	30.4-46.1(3.1-4.7)	63.7-83.4(6.5-8.5)	73.5-98.1(7.5-10)
14	1.5	58.8-83.4(6.0-8.5)	118-157(12-16)	127-177(13-18)
	2.0	53.9-73.5(5.5-7.5)	108-137(11-14)	118-167(12-17)
16	1.5	93.2-127(9.5-13)	177-235(18-24)	196-265(20-27)
	2.0	88.3-118(9.0-12)	157-216(16-22)	186-255(19-26)

Identification marks of nut



Identification marks of stud

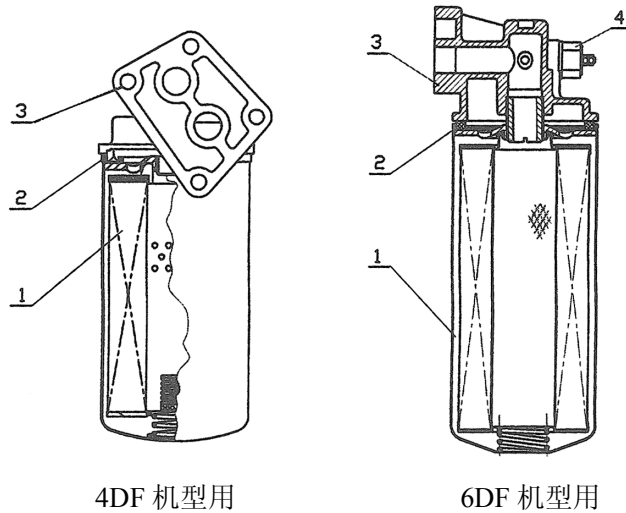


The mechanic performance table of bolts in China

Quality Grade(mark)	6.8	8.8	9.8	10.9	12.9
Tensile strength limit obmax(MPa)	600	800	900	1040	1220
Yield limit osmax(MPa)	480	640	720	940	1100
Corresponding to Hyundai standards	4T	6T	7T	8T	10T

The number before the radix point represents one percent of the nominal tensile strength;

The number after the radix point represents ten times of the ratio of the nominal yield limit and nominal tensile strength.



4DF 机型用 6DF 机型用

图 3-3 机油滤清器

1-旋装滤芯 2-橡胶密封圈 3-滤座 4-堵塞报警器

Fig 3-3 oil filter

For 4DF For 6DF

1.spin-on stage 2.rubber ring 3.seat 4.restriction alarm

3.3 cooling system

Cooling system consists of water pump, thermostat, fan, water drain trap, water outlet pipe (thermostat house for 4DF), and water tank radiator in the car, etc. (Fig. 3-4). The water from radiator is pumped to the inlet hole on the left side of cylinder block by the centrifugal water pump. Passing through oil cooler the cooling water enters water jacket of each cylinder, then the cylinder head, finally the water outlet pipe (thermostat house for 4DF). Two thermostats for adjusting water temperature are set on the end of water outlet pipe for 6DF; while a thermostat is set in the thermostat house for 4DF. The principle is as follows: If the temperature of the cooling water from the water outlet pipe (thermostat house for 4DF) is lower than opening temperature, the thermostat will close, the cooling water directly returns to water pump through the gluey pipe, and no longer enters radiator, this called small cycle; when the temperature of cooling water exceeds the all-open temperature, the control valves of thermostats open, then the cooling water enters radiator.

The engine adopt waxen thermostat. When the thermostats fully open, their lift should not be less than 8mm if thermostat can not open, outlet water temperature will increase soon, so it must be changed termly. Users can put thermostat in water and burn it to check if thermostat works well.

When the ambient temperature is below 0°C, in case that the machine would be frozen, antifreeze fluid should be added to the cooling water. Generally the antifreeze fluid has three types: alcohol-water type, glycerin-water type, and glycol-water type. Different ratios of these chemical materials to water will lead to different freezing points. The ingredients of antifreeze fluid display in table 4-3

Table 4-3 Ingredients of antifreeze fluid

Freezing point (°C)	Alcohol-water type (Alcohol mass percentage%)	Glycerin-water type (Glycerin mass percentage%)	Glycol-water type (Glycol mass percentage%)
-5	10	21	-
-10	20	32	28
-15	25	43	32
-20	30	51	38
-25	35	58	45
-30	40	64	48
-40	55	73	55
-50	70	-	60

Note:

1. The antifreeze fluid is not edible for its toxicity.
2. After temperature increased, heat expansion amount of antifreeze fluid is much big.
So the injection amount of antifreeze fluid should be 8% less than the previous injection amount of water, in case those components such as water tank will be breached.
3. The poor antifreeze fluid, which corrodes the cylinder block, is forbidden.
Antifreeze fluids of different ingredients or brands cannot be mixed.

4.4 Preparations before starting

4.4.1 Preparations before starting

Check the level of lubricating oil in the oil sump.

Check the stored diesel oil in the fuel tank and open the fuel switch.

Check whether the cooling water in the water tank of radiator and subsidiary water tank is full.

A new engine should be deaerated the fuel system and cooling system according to the following way.

4.4.2 Deaerate the fuel system

Air in the fuel system may cause abnormal fuel supply of the injection pump, resulting in difficulties in starting the engine, unstable running and even forcing the engine to stop. Therefore the fuel system must be deaerated when the fuel in the fuel tank runs out and needs refilling or when the injection pump, the fuel filter and the fuel pipes have been removed and refitted.

Below are the procedures of deaerating air in the fuel system:

Unscrew the outlet screw on the fuel filter and then press the handle of fuel supply pump

1.2 Temperature and pressure Parameter of diesel engine

Exhaust temperature before turbo	°C	≤650
Diesel oil temperature	°C	40±5
Lubricating oil temperature	°C	≤95
(rated speed)		
Outlet temperature of coolant	°C	85±5
Pressure of lubricating oil		≥150
(Idling speed kPa)		
Rated speed kPa		343~441
(Allowed lowest pressure)		

1.3 Tighten torque and tighten method of main screw thread connections

Table 1-1

Description	quantity×specification	Screw tighten torque(N.m)	Note
Cylinder head bolt	26×M15×2	245±15	Spread lubricating oil
Connecting rod	12×M12×1.5	155±5	Spread screw thread glue
Flywheel bolt	7×M16×1.5	275±10	Spread lubricating oil
Main bearing bolt	14×M18	90N.m+180°	Rotating angle method
Piston cool nozzle tighten bolt	6×M12	35±5	Don't Spread screw thread glue
Damper tighten bolt	5×M14×1.5	180±10	Spread screw thread glue
Timing gear tighten bolt-camshaft	1×M20×1.5	206 +9.8 -19.6	Spread lubricating oil
Air compression pump gear shaft tighten bolt	1×M12	63 +9.8 0	Spread screw thread glue
Air compression pump gear tighten nut	1×M18	157 +4.9 -24.5	Spread lubricating oil
Front oil seal seat bolt	5×M12	59 +8 -12	
Rear oil seal seat bolt	5×M8	20 +5 -7	
Fuel injection pump driven gear tighten nut	1×M20×1.5	157 +4.9 -24.5	Spread lubricating oil

Fault code	P0016	Display content	Signal deviation between crankshaft and camshaft sensor
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Fault inspect for accelerator pedal sensor (1)

Fault code	P0122	Display content	Signal of accelerator pedal sensor (1) is too low
Fault code	P0123	Display content	Signal of accelerator pedal sensor (1) is too high
Fault code	P0121	Display content	Signal of accelerator pedal sensor (1) is invalidation

Fault inspect for accelerator pedal sensor (2)

Fault code	P0222	Display content	Signal of accelerator pedal sensor (2) is too low
Fault code	P0223	Display content	Signal of accelerator pedal sensor (2) is too high
Fault code	P0221	Display content	Signal of accelerator pedal sensor (2) is invalidation

Fault inspect for cooling temperature exceed upper limited value

Fault code	P0217	Display content	Cooling liquid temperature of diesel engine is too high
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Fault test for fuel injector

Fault code	P0262	Display content	Short circuit between 1st cylinder fuel injector junction and battery
Fault code	P0261	Display content	1st cylinder fuel injector two junctions short circuit
Fault code	P0265	Display content	Short circuit between 2nd cylinder fuel injector junction and battery
Fault code	P0264	Display content	2nd cylinder fuel injector two junctions short circuit
Fault code	P0268	Display content	Short circuit between third cylinder fuel injector junction and battery
Fault code	P0267	Display content	3rd cylinder fuel injector two junctions short circuit
Fault code	P0271	Display content	Short circuit between 4th cylinder fuel injector junction and battery
Fault code	P0270	Display content	4th cylinder fuel injector two junctions short circuit
Fault code	P0274	Display content	Short circuit between 5th cylinder fuel injector junction and battery
Fault code	P0273	Display content	5th cylinder fuel injector two junctions short circuit
Fault code	P0277	Display content	Short circuit between 6th cylinder fuel injector junction and battery
Fault code	P0276	Display content	6th cylinder fuel injector two junctions short circuit

Fault test for high pressure oil rail

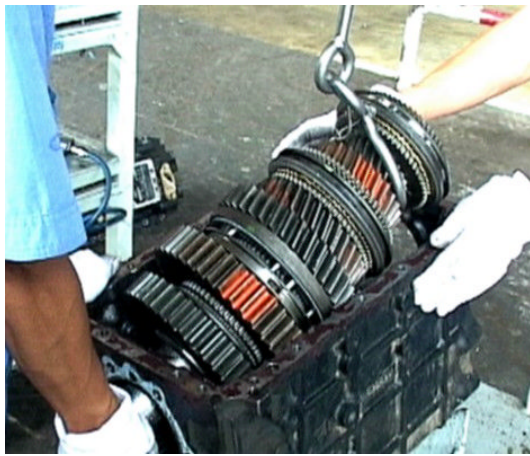
Fault code	P0193	Display content	Voltage is higher than top limited
Fault code	P0192	Display content	Voltage is lower than low limited
Fault code	P0191	Display content	Rail pressure sensor is wrong

V -2. Maintenance Criteria

Item	Standard Dimension(mm)	Wear Limit (mm)
Flank Clearance for All Gears		
Rev.	0.08 ~ 0.16	0.50
1 st	0.08 ~ 0.18	
2 nd	0.08 ~ 0.16	
3 rd	0.08 ~ 0.16	
4 th -6 th	0.04 ~ 0.12	0.40
Axial Clearance for Main Shaft Gears		
Rev. Gear	0.20 ~ 0.35	1.00
Idle Gear	0.15 ~ 0.60	1.20
1st Gear	0.15 ~ 0.30	0.80
2nd Gear	0.15 ~ 0.30	0.80
3rd Gear	0.15 ~ 0.30	0.80
4th Gear	0.15 ~ 0.30	0.80
6th Gear	0.175 ~ 0.475	1.80
Flank Clearance for Blocks on Shift Bar Housing		
Rev and 1 st /2 nd	1.2 ~ 5.0	5.1
1 st /2 nd and 3 rd /4 th	0.9 ~ 3.3	3.4
3 rd /4 th and 5 th /6 th	1.7 ~ 4.5	4.6
Other Clearance		
Spare Travel for Synchronizer (2 nd to 6 th)	1.8 ~ 2.35	Min0.2



29. Screw main shaft screw cap onto main shaft



30. Lift main shaft out



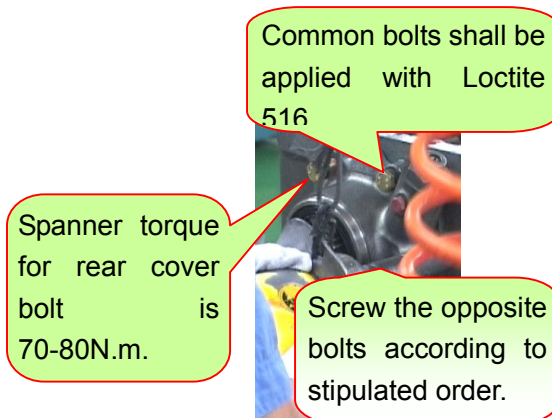
31. Remove counter shaft rear cover screw



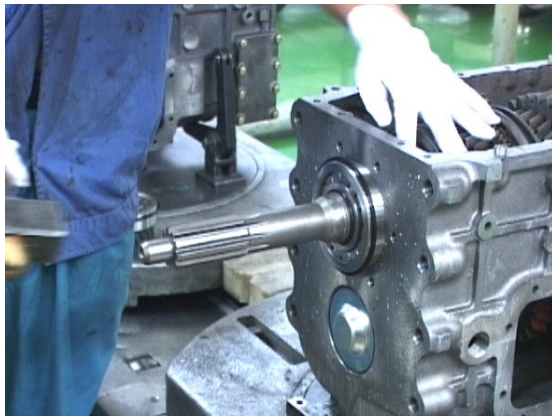
32. Knock down counter shaft rear cover



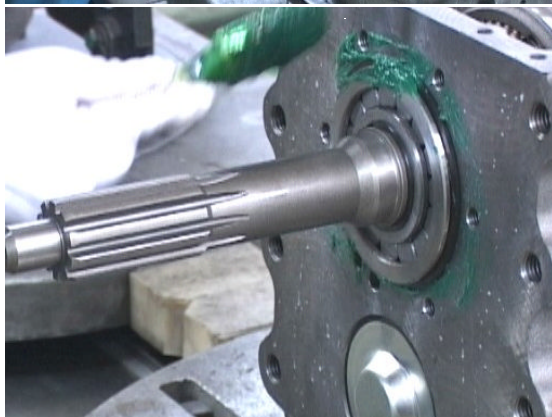
17. Install rear bearing cover and screw to the 2-3 thread



18. Tighten rear cover screw



19. Install input shaft ass'y



20. Put glue on the place installing input shaft cover



17. Install 6th synchro ring



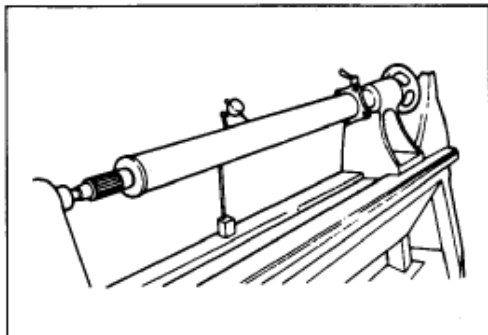
18. Install 5/6 synchro ass'y



19. Choose circlip



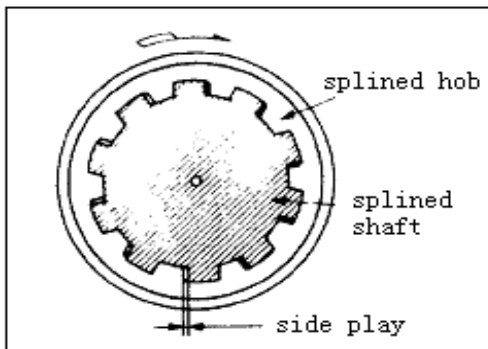
20. Install the circlip into slot



The concentricity of the propeller shaft:
Measure the concentricity at the center of the propeller shaft.

(mm)

Standard	Limit
≤0.5	1.0

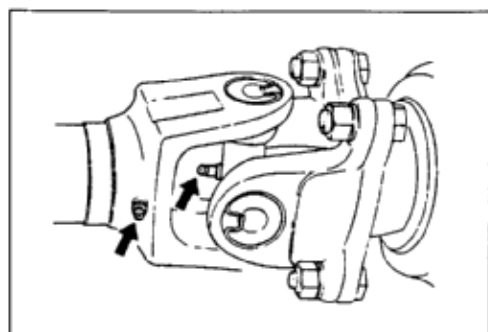


The clearance when the spline rotates in normally direction:

Check the clearance between the spline and sleeve in normal direction with clearance gauge.

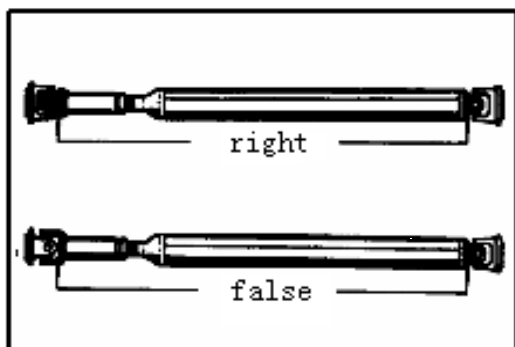
(mm)

Standard	Limit
≤0.1	0.3



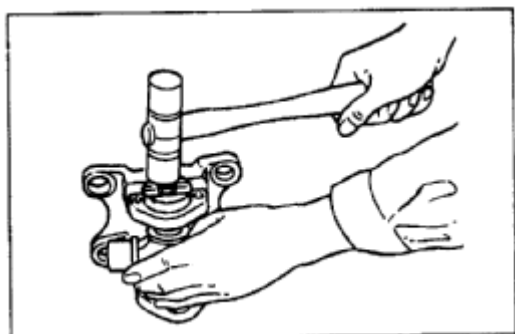
Lubricate universal joint of driveshaft and slip sleeve:

Lubricate with short lubricator until the grease overflows.(only for general grease)



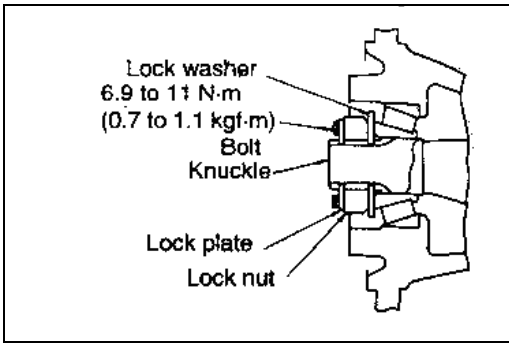
The assembly of the spline and slip joint:

Take notice at the arrow marks on the slide joint and rear propeller shaft, the arrow should be matched.

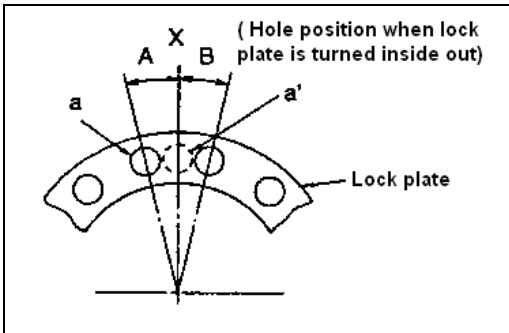


The assembly of the needle roller bearing:

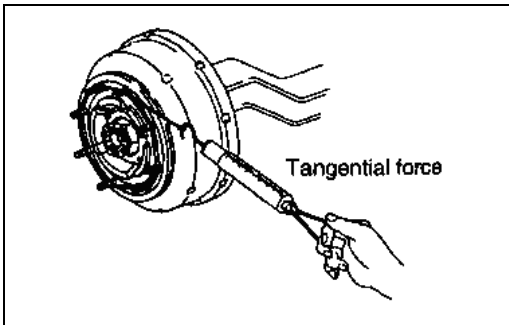
Apply the grease on the oil seal and bearing, assemble the spider into the flange yoke, assemble the needle roller bearing into the flange yoke hole, and tap it with a soft hammer.



(C) Install the lock plate and make sure that the lock nuts are all(three) aligned with the bolt holes of the lock plate. Then tighten the lock bolts to 6.9 to 11 Nm(0.7 to 1.1 kgf.m). If the lock nut and lock plate bolt holes are not aligned, proceed as follows:



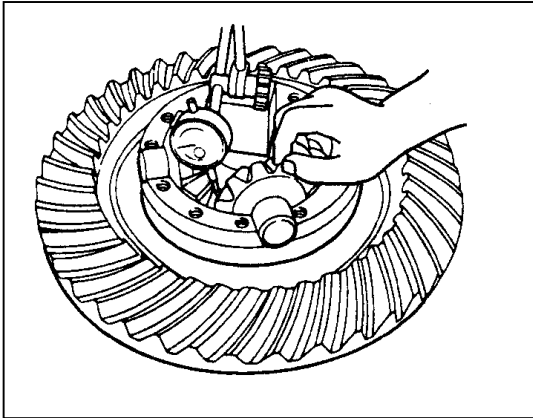
1. If the lock nut hole is within ranges A, loosen the lock nut and align with hole a.
2. If the lock nut hole is within range B, turn the lock plate inside out and loosen the lock nut and align with hole a.
3. If the lock nut hole is on X-X axis, turn the lock plate inside out and the holes will be aligned.



- (d) Perform the same procedure as in step(c)
- (e) Measurement of wheel hub bearing starting torque. Install a spring balancer to a hub bolt and pull slowly in the tangential direction to measure the tangential force as the wheel hub starts to turn. If the tangential force so measured is not as specified, repeat from(c).

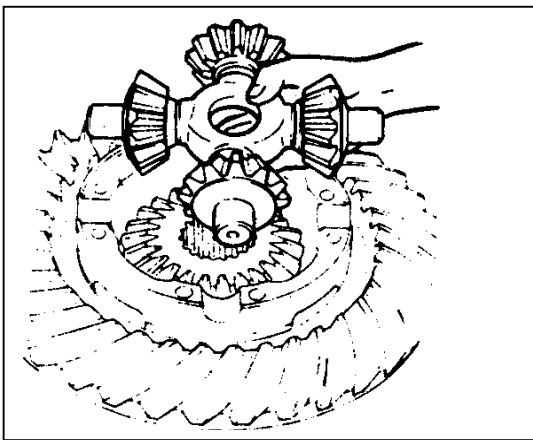
Note:

1. If the tangential force is within nominal value range, the starting torque should be as specified. If the tangential force is out of specification, readjust the starting torque.
2. The starting torque must not exceed the upper limit of the nominal value.
3. Before taking measurement, make sure that the lining is not in contact with the drum.

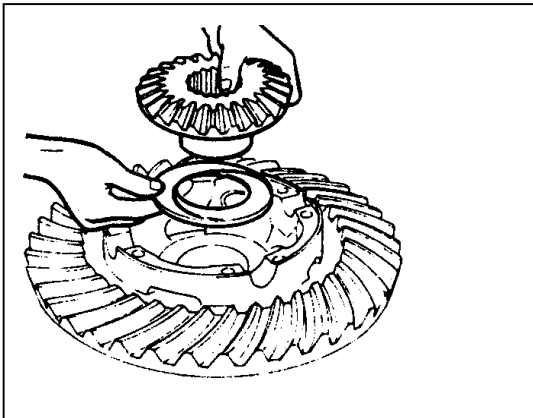


3)、 Inspection and record the backlash of planet gear

Note: locking the cross shaft when check backlash

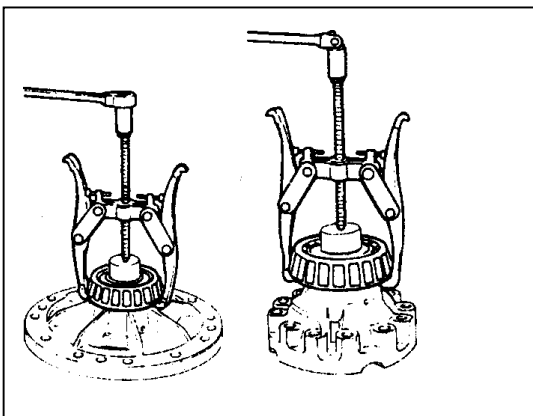


4)、 disassembly the cross shaft & planet gear assy', then take out the planet gear and washer



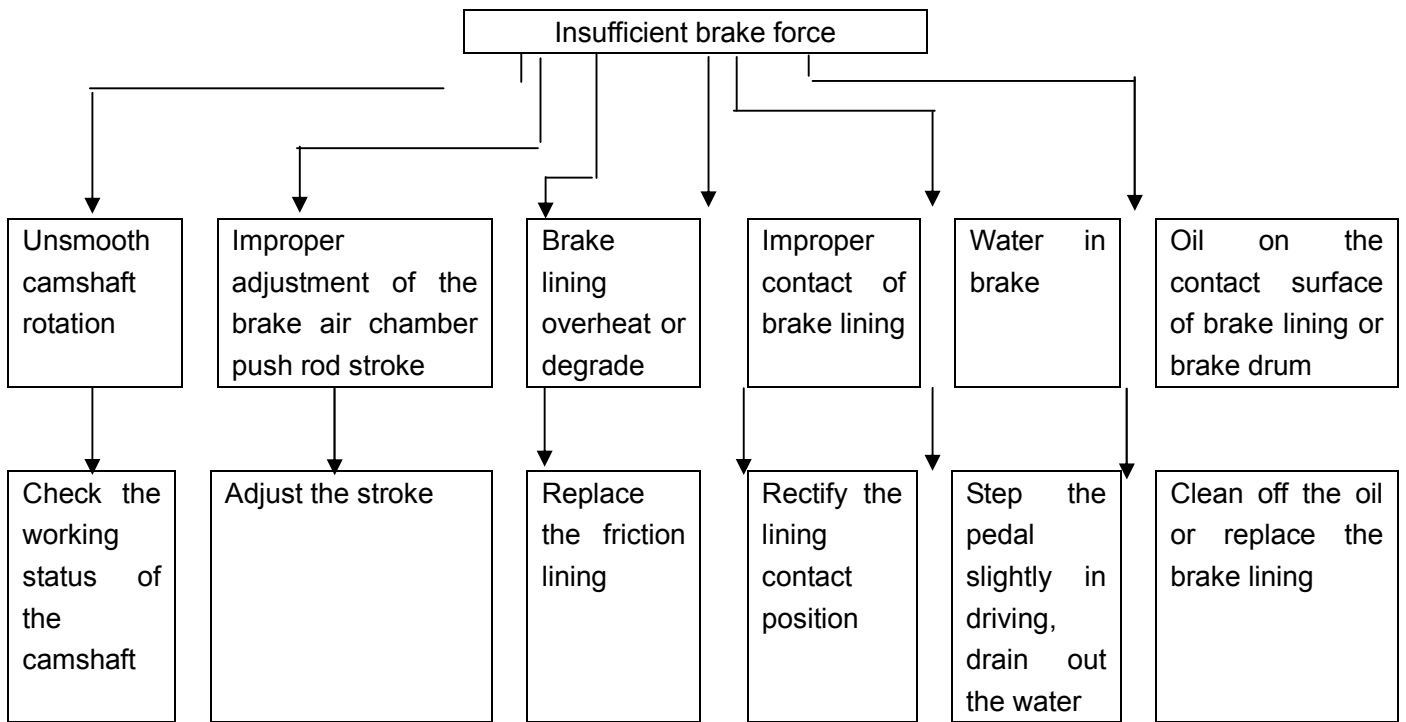
5)、 take out shaft gear and shim

6)、 remove the ring gear

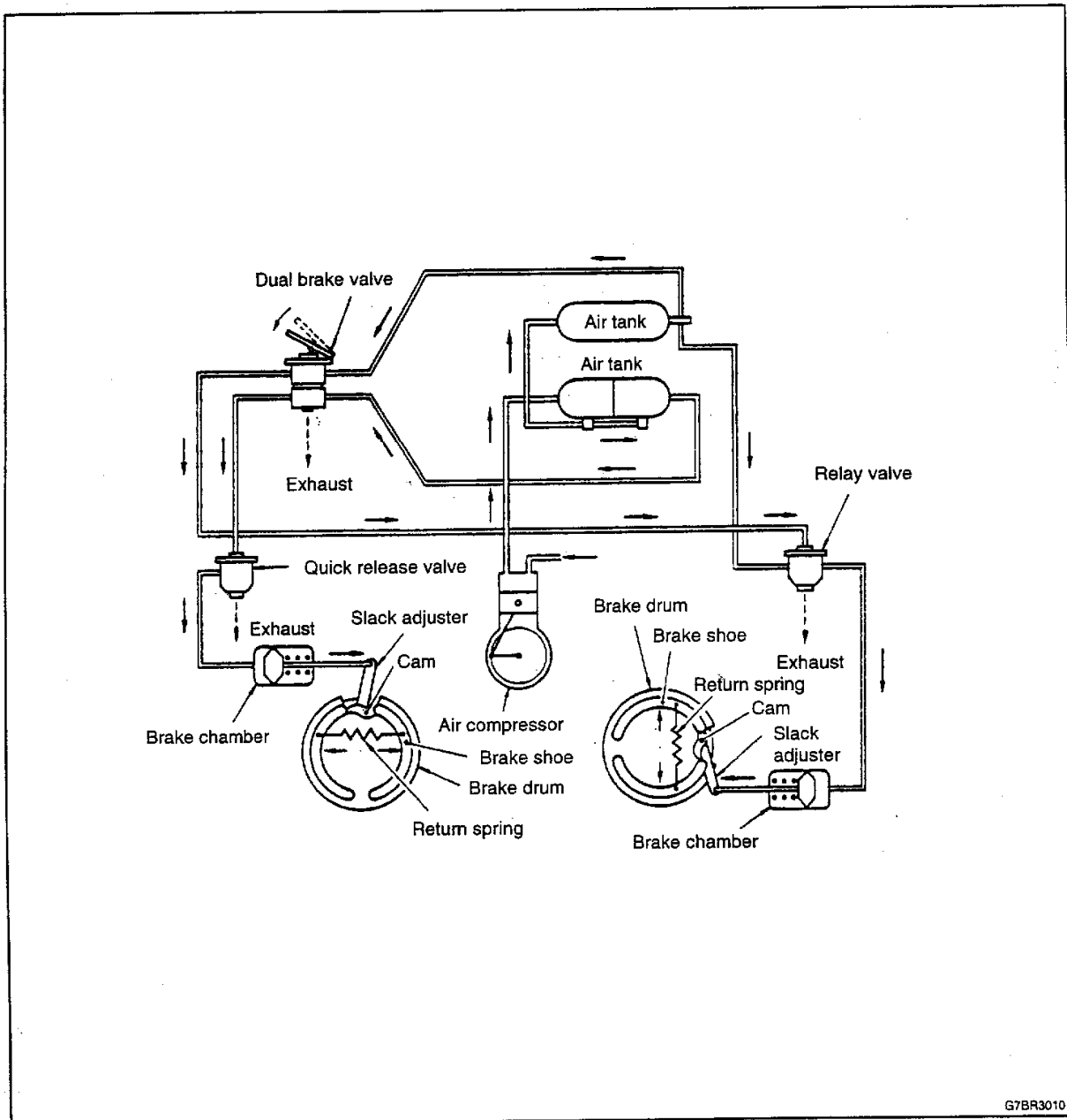


7)、 disassembly differential case B/R

5 Insufficient brake force



Inspection Principle



G7BR3010

The compressed air is constantly supplied to the delivery port of the air brake.

When the pedal (dual brake valve) is depressed, the compressed air flows via the relay valve (quick release valve in the case of the front wheels) to the brake chamber to actuate the slack adjuster. The slack adjuster turns the cam which forces the brake shoes against the brake drum to decelerate or stop the vehicle.

When the pedal is released, the compressed air is released to atmosphere and the brake shoes return to the original position.